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| 10/551,383 | 09/29/2005 | Youichi Arai | 050640 | 3160 |
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| KRATZ, QUINTOS & HANSON, LLP | | | EXAMINER | |
| 1420 K Street, N.W. | | | BERHANU, SAMUEL | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|--------------------------------------|------------------------------------|
| Office Action Summary | Application No. 10/551,383 | Applicant(s) ARAI ET AL. |
| | Examiner SAMUEL BERHANU | Art Unit 2838 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 29 September 2005.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-6 and 8-13 is/are rejected.

7) Claim(s) 7,14 and 15 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO-146a/b)
 Paper No(s)/Mail Date 8/22/2006, 12/05/2005, 9/29/05

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____

5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 6 and 8 -9 are rejected under 35 U.S.C. 102(b) as being anticipated by Okumura et. al (USP 5,717,256) (Hereinafter Okumura).

AS to Claim 1, Okumura discloses in Figure 1 and Column 2, lines 1—31, a method for estimating residual discharge capacity of a battery for allowing a maximum current to be supplied continuously to a load, said method comprising the steps of: estimating a terminal voltage drop of the battery when a maximum current at high rate discharge is continuously supplied to the load; and estimating the residual discharge capacity by subtracting undischARGEable charge calculated based on the estimated terminal voltage drop of the battery from dischargeable charge in the battery in any state of charge (See below).

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(15) As the remaining battery capacity estimation device, the present invention can employ such a remaining battery capacity estimation device which accumulates the discharge current of the battery to calculate the discharged quantity, and calculates the remaining battery capacity from the difference between the battery capacity and the discharged quantity. In this case, the remaining battery capacity estimation device measures the non-load voltage of the battery, and detects that the actual remaining battery capacity becomes small earlier than the estimated remaining battery capacity.

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AS to Claim 2, Okumra discloses in Figure 1 and Column 2, lines 1-31, a method for estimating residual discharge capacity of a battery for allowing a maximum current to be supplied continuously to a load, said method comprising the steps of: estimating a maximum terminal voltage drop of the battery when a maximum current at high rate discharge is continuously supplied to the load; calculating a rate of the estimated maximum terminal voltage drop of the battery to a maximum allowable voltage drop of the battery corresponding to the maximum current (see Column 2, lines 1-31), estimating the residual discharge capacity by subtracting undischARGEable charge capacity based on the rate from dischargeable charge in the battery in any state of charge.

AS to Claim 6, Okumura discloses in Figure 1 and Column s 1-31,a method for estimating residual discharge capacity of a battery for allowing a maximum current to be supplied continuously to a load, said method comprising the steps of: estimating a maximum terminal voltage drop of the battery when a maximum current at high rate discharge is continuously supplied to the load; and estimating the residual discharge capacity by subtracting undischARGEable charge calculated based on the estimated maximum terminal voltage drop of the battery from dischargeable charge in the battery in any state of charge.

(15) As the remaining battery capacity estimation device, the present invention can employ such a remaining battery capacity estimation device which accumulates the discharge current of the battery to calculate the discharged quantity, and calculates the remaining battery capacity from the difference between the battery capacity and the discharged quantity. In this case, the remaining battery capacity estimation device measures the non-load voltage of the battery, and detects that the actual remaining battery capacity becomes small earlier than the estimated remaining battery capacity.

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AS to Claim 8, Okumura discloses in Figure 1 and Column 2, lines 1-31, an apparatus for estimating residual discharge capacity of a battery for allowing a maximum current to be supplied continuously to a load, said apparatus comprising: a device for estimating (20,21) a terminal voltage drop of the battery when a maximum current at high rate discharge is continuously supplied to the load; and a device (22) for estimating the residual discharge capacity by subtracting undischARGEable charge calculated based on the estimated terminal voltage drop of the battery from dischargeable charge in the battery in any state of charge.

(15) As the remaining battery capacity estimation device, the present invention can employ such a remaining battery capacity estimation device which accumulates the discharge current of the battery to calculate the discharged quantity, and calculates the remaining battery capacity from the difference between the battery capacity and the discharged quantity. In this case, the remaining battery capacity estimation device measures the non-load voltage of the battery, and detects that the actual remaining battery capacity becomes small earlier than the estimated remaining battery capacity.

AS to Claim 3, Okumura discloses in Figure 1, estimating residual discharge capacity of said maximum voltage drop is a differential voltage between an already known full-charge open circuit voltage of the battery and an end of on-load discharge voltage defined by a limit voltage to supply the maximum current to the load (See Column 2, lines 1-31).

As to Claim 9, Okumura discloses in Figure 1, a device for calculating a rate of said estimated voltage drop to a differential voltage between an end of on-load discharge voltage defined by a limit voltage to supply the maximum

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current to the load and an already known full-charge open circuit voltage of the battery; and a device for estimating residual discharge capacity by subtracting charge corresponding to said calculated rate using the end of on-load discharge voltage at high rate discharge from dischargeable charge in the battery in any state of charge (see Column 2, lines 1-31).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-5, 10-11 and 12-13 rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura in view of Arai (US 2003/ 0025506)

AS to Claims 4, 10, and 12, Arai discloses in Figures 1-5, and paragraph 011and 012, 103, 105 and 132,wherein said device for estimating a terminal voltage drop includes: a device for estimating a voltage drop due to a resistance component of the battery estimated at high rate discharge; a device for calculating a voltage drop due to an maximum increased resistance component varied corresponding to the state of charge of the battery; and a device for estimating a saturated voltage

drop due to polarization as a maximum voltage drop due to polarization generated by the maximum current, wherein said device for estimating a

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terminal voltage drop estimates the maximum voltage drop based on voltages calculated or estimated by said respective devices.

It would have been obvious to a person having ordinary skill in the art at the time of the invention to measure battery voltage drop due to polarization and resistance elements of the battery as taught by Arai in Okumura battery capacity estimation method in order to obtain accurate remaining battery capacity.

AS to Claims 5,11 and 13, Arai discloses in Figures 1-5, and paragraphs 11and 012 ,013, 105 and 132, wherein said saturated voltage drop due to polarization is estimated as a maximum voltage drop due to polarization corresponding to electric current given by an approximated curve of current-polarization characteristics of the voltage drop due to polarization obtained by removing the voltage due to drop resistance component from an approximated curve of a current-voltage characteristics derived based on data pairs obtained by periodically measuring the discharge current to the load high rate discharge, and terminal voltages of the battery corresponding to the discharge current.

Allowable Subject Matter

5. Claims 7, 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: For Claims 7, 14 and 15: primarily, the prior art of record does not disclose or suggest in the claimed combination: wherein said residual discharge capacity is revised by multiplying the estimated residual discharge capacity of the

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battery by a previously calculated rate of residual discharge capacities of deteriorated and undeteriorated batteries.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAMUEL BERHANU whose telephone number is (571)272-8430. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm Ullah can be reached on 571-272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Adolf Berhane/
Adolf Berhane
Primary Examiner
Art Unit 2838

SB

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